



PLANT IMMIGRANTS

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TWO RECENT EXPLORATIONS

CHAULMOOGRA TREES

Illustrations

Plate 349. Some of Mr. Rock's introductions from Yunnan.

Plate 350. Chaulmoogra plants, source of the drug believed to cure leprosy.

United States Department of Agriculture
BUREAU OF PLANT INDUSTRY
OFFICE OF FOREIGN SEED AND PLANT INTRODUCTION

ANNOUNCEMENTS OF IMPORTANCE TO ALL EXPERIMENTERS.

The Office still has limited stocks of *Taraktogenos kurzii*, the true chaulmoogra tree, and *Oncoba echinata*, an allied shrub known also to yield chaulmoogric acid. Experimenters in tropical regions who have not yet secured these, and who would like to do so, can be supplied if their requests are received at once. In all probability, neither of these plants will be included in the general distributions next winter.

Ilex paraguariensis, Yerba mate or Paraguay tea, was described in the January number of Plant Immigrants. A limited number of young plants is still available for distribution. The meager information at our command leads us to doubt that they can be grown successfully in regions too cold for the lemon. Experimenters who are desirous of testing this species should apply at once.

To Experimenters who have received plants from this Office in past years, we desire to point out the value of Reports on the Behavior of Former Introductions which appear in Plant Immigrants.

If any of the plants which have been sent you have flowered or fruited; if you have made observations on the amount of cold or drought which they will stand; if you have learned things regarding their cultural requirements or the best methods of propagation, then you should share this information with others. For it should be remembered that there are probably many people who are growing the same plants which have been sent you, and they may be helped and encouraged by your experiences. Furthermore, these first records concerning the behavior of plant introductions may later have real historical value. We urge all Experimenters therefore to send to this Office useful or interesting information concerning plants which they have under trial.

Plants recently received, not yet available for distribution.

COLVILLEA RACEMOSA (Caesalpinaceae), 58460. From Port-of-Spain, Trinidad, British West Indies. Seeds presented by W. G. Freeman, Director of Agriculture. This handsome tropical tree, believed to be native to East Africa, should be tested in southern Florida alongside the poinciana, to which it is related. It is said to reach 40 or 50 feet in height. The pinnate leaves are 3 feet in length, and the brilliant scarlet, curiously shaped flowers are borne in drooping racemes more than a foot long. The tree was named for Sir Charles Colville, Governor of Mauritius; it was discovered in 1824 on the west coast of Madagascar, where it flowers in April or May.

In all probability, it will stand no more frost than the poinciana. Like most other leguminous trees, it is readily propagated from seeds. Since it is not yet commonly cultivated in tropical America, it is recommended for trial in Porto Rico, Cuba, the Canal Zone and elsewhere.

COROKIA VIRGATA (Cornaceae), 58607. From Elstree, Herts, England. Seeds presented by Hon. Vicary Gibbs, Aldenham House Gardens. A slender-branched shrub, 6 to 12 feet high, native to the most northern part of New Zealand, where mild weather prevails throughout the year. The shining-green, oblong-spatulate leaves are downy white beneath, and the yellow blossoms, about half an inch across, are in 3-flowered clusters.

DIOSCOREA spp. (Dioscoreaceae). From Mayaguez, Porto Rico. Tubers presented by T. B. McClelland, horticulturist, Porto Rico Agricultural Experiment Station.

58625. **DIOSCOREA CAYENENSIS**. **Yellow Guinea yam**. "Congo." According to C. F. Kinman, who studied the yams of Porto Rico exhaustively, this variety is called "congo amarillo" (yellow congo) at Mayaguez and "yellow guinea" at San Juan. It thrives much better in sandy soil than most other varieties, and the large cylindrical roots attain a length of one foot and a weight of 4 to 5 pounds in favorable seasons. The interior is light yellow, and turns dark brown when exposed to the air. It is more evenly grained than most of the water yams; indeed it is not less smooth than the white guinea or the potato yam. When cooked, it is deep yellow and of good texture. The flavor is pleasant, and satisfactorily rich. The vines are small and very strong, moderately vigorous in growth, and the stems not angled as in some others. The variety is of interest for testing in the South, where the establishment of yams from all parts of the world is now receiving consideration.

58626. **DIOSCOREA ROTUNDATA**. **White Guinea yam**. "'Guinea yam.'" A white-fleshed yam of excellent quality, and one of the most popular varieties grown in Porto Rico. The tubers are usually cylindrical, and commonly weigh from 3 to 6 pounds each at maturity." (R. A. Young.)

EHRHARTA ERECTA (Poaceae), 58572. From South Yarra, Victoria. Seeds presented by William Laidlow, government botanist, National Herbarium of Victoria. "'Panic Veldt grass.'" This was first introduced into Victoria in 1910 from South Africa, where it is native. It is a biennial or short-lived perennial, and appears to be naturally adapted to regions having mild winters, where it springs up after the autumn rains and grows through the winter, maturing in early summer. It is not particular as to soil and seems to do best in partial shade, growing in places too dark for most grasses. It produces an abundance of foliage." (Laidlow.)

KOKIA DRYNARIOIDES (Malvaceae), 58574. From Honolulu, Hawaii. Fruits presented by C. S. Judd, Superintendent of Forestry. This interesting tree, closely related to the cotton plant, is native to the Hawaiian Islands, where it has become practically extinct in recent years. In forwarding this seed, Mr. Judd writes: "So far as I know, there is now only one tree of this species in existence. It is growing at Kauluwai and was raised from seeds obtained from the last wild tree at Mohana, now dead, discovered and described by J. F. Rock." It should be added that a young specimen is growing lustily in the Plant Introduction Garden at Miami, Florida. It is now about ten feet high.

In his paper on "The Hawaiian Genus *Kokia*" (Botanical Bulletin No. 5, Board of Agriculture and Forestry, Honolulu) Mr. Rock states that *Kokia drynarioides* was first discovered by Nelson, companion of the great circumnavigator Captain Cook. The plant has long-stemmed, heart-shaped leaves and bright-red flowers of silky texture. It reaches 15 to 25 feet in height with a trunk 6 inches or more in thickness. It was originally described as a species of *Gossypium*, so close is its relationship to that genus, and it has been termed "Molokai Red cotton" in Hawaii.

It has been suggested that the species may be of value to plant-breeders for crossing with the cultivated cottons, and for this reason, as well as the fact that it is an attractive ornamental plant, efforts have been made to prevent it from disappearing altogether. Unless some unforeseen accident should occur to the mature plant in Hawaii from which Mr. Judd sends these seeds, it should be possible, within a few years, to have many specimens in cultivation.

LILIUM sp. (Liliaceae), 58595. Lily. From Yunnan, China. Seeds collected by J. F. Rock, Collaborator of the Bureau of Plant Industry. "(October, 1923.) A small lily 10 to 12 inches high which grows on the alpine meadows of the Sila Pass, Mekong-Salwin Divide, at an altitude of about 12,000 feet. It is well worthy of cultivation on account of its drooping, rich purplish black, bell-shaped flowers tinged with carmine, which are 1 or 2 inches long and broad." (Rock.)

LONICERA TRICHOPODA (Caprifoliaceae), 58614. **Honeysuckle.** From Elstree, Herts, England. Seeds presented by Hon. Vicary Gibbs, Aldenham House Gardens. A slender-branched shrubby honeysuckle from Yunnan, China, with narrowly oblong leaves, which are covered with fine hairs. The yellowish white flowers are marked with red and are followed by bright-red berries.

MARKHAMIA sp. (Bignoniaceae), 58593. From Umtali, Rhodesia, South Africa. Seeds presented by Rev. E. H. Greely, who describes this as a native Rhodesian tree with yellow flowers 2 inches across. His further statement, that it resembles *Spathodea* in general character, suggests that we may have, in this species, a valuable addition to the list of flowering trees which can be cultivated successfully in Florida and California. Its hardiness is open to question, but the behavior of other plants from the same general region gives grounds for believing that it will stand light frosts at least.

MOMORDICA COCHINCHINENSIS (Cucurbitaceae), 58554. From Manila, Philippine Islands. Seeds presented by P. J. Wester, Bureau of Agriculture. "This is a very vigorous native Philippine vine with large, round, handsome, greenish yellow fruits which should make it popular as an ornamental vine in southern Florida, Porto Rico, and Panama. The immature fruits are boiled and eaten with meat, and the tender leaves also are boiled and eaten. The large seeds appear to be very rich in oil which, so far as I know, has never been investigated." (Wester.)

PASPALUM NOTATUM (Poaceae), 58644. **Bahia grass.** From San Jose, Costa Rica. Seeds purchased from J. Alfredo Quiros. This shipment of seed has been obtained from Costa Rica, to assist in establishing Bahia grass in the southern United States, where it has already been tested and has shown great promise. The Office of Forage Crop Investigations, which is occupied with the matter, has prepared the following note regarding the culture of this species:

Bahia grass (*Paspalum notatum* Fluegge) is a perennial grass forming a dense sward of leaves and with flowering culms about one foot high, 2-branched at the top. It is primarily a pasture grass. It is native from Cuba and Mexico southward to Argentina, and has many local names. In western Cuba, where it is the common pasture grass, it is "Cana Mazo," mat cane; in Costa Rica, "Gengibrillo;" in Panama, "Ginger grass;" in Argentina, "Gramillon," "Pasto Dulce," "Pasto Manso," "Gramilla Blanca." It is generally recognized as a very valuable pasture grass. The rootstocks are very stout, so that even on very sandy soil the grass makes a firm sod.

Bahia grass has proved hardy throughout Florida and as far north

as McNeill, Miss. It succeeds on nearly all types of soil, even on the sand hills, but best in fairly firm soils.

The grass can easily be propagated by division, and it produces seeds abundantly throughout the warm season. Unfortunately the seeds for some obscure reason do not germinate well. This has proved true of seeds from Cuba, from Florida, and from Costa Rica. Even when the seeds are decorticated or treated with sulfuric acid the germination is still poor, usually below 10 per cent. This difficulty is the principal impediment to the extensive culture of Bahia grass at present.

At the Florida Experiment Station, Bahia grass is spreading year by year in spite of the apparently poor seeds, even into land already occupied by other grasses. A firm seed bed seems desirable. In Florida the best germination has been secured by sowing the seeds in the latter part of May and in June.

The ergot which attacks Dallis grass and many other species of *Paspalum* also affects Bahia grass. Indeed, in parts of Argentina where the pastures are largely of this grass, the ergot causes a disease of cattle apparently the same as that caused by the same ergot on Dallis grass in Mississippi. It is not likely, however, that this ergot will ever be serious except perhaps in limited areas where Bahia grass or Dallis grass makes up the whole pasturage.

SCHIZANDRA RUBIFLORA (Magnoliaceae), 58619. From Elstree, Herts, England. Seeds presented by Hon. Vicary Gibbs, Aldenham House Gardens. A climbing shrub, often 20 feet in height, which grows at high altitudes in the mountains of western China. The oblong or obovate, sharp-pointed leaves are dark green above and paler below, and the solitary dark-red flowers are about an inch across.

TIGRIDIA PAVONIA (Iridaceae), 58573. From Casa Alvarado, Coyoacan, Mexico. Seeds presented by Mrs. Zelia Nuttall. This plant is native about Mexico City, where its bulbous roots, under the name of "cacomites," have long been used as food. It is not unknown in the United States, though its culture has never become widespread in this country. It is with a view to popularizing it that the Office of Foreign Seed and Plant Introduction has secured, through the kindness of Mrs. Nuttall, a large quantity of seed, grown mainly at Coyoacan. Dr. David Griffiths, who has charge of work with bulbous plants in this Department, has undertaken to grow these seeds, and to utilize the resulting plants in furthering the dissemination of the species in the United States. He has supplied the following note regarding it:

"Although this species, like the dahlia, is looked upon as a food plant in some quarters, it will in all probability be more often employed as an ornamental in the United States. Its beautiful, delicate flowers with their unique and peculiar markings, make it an object of



CHAULMOOGRA PLANTS, SOURCE OF THE DRUG BELIEVED TO CURE LEPROSY.

(*Taraktogenos kurzii* King; S. P. I. No. 56633.)

The adventurous journey of Agricultural Explorer J. F. Rock in search of the chaulmoogra tree, source of a drug which repeated experiments have shown to possess immense value in the treatment of leprosy, not only resulted in clearing up the mystery which surrounded the identity of this plant but furnished supplies of seeds by means of which it is hoped to establish chaulmoogra plantations in Hawaii and elsewhere. Three thousand young plants, shown above in one of the greenhouses at the Plant Introduction Garden, Bell, Md., have been grown during the past season and are being distributed widely in tropical countries. (Photographed by Wilson Popenoe, August 27, 1923; P35027FS.)



SOME OF MR. ROCK'S INTRODUCTIONS FROM YUNNAN.

The plants collected by Agricultural Explorer J. F. Rock in the remote Province of Yunnan, southwestern China, are being propagated in the United States and distributed to experimenters for trial. Mr. Rock has sent in large quantities of seeds, including many interesting species of *Pyrus*, *Malus*, and other genera well known in the Temperate Zone. The above illustration shows several rows in the nursery at the Plant Introduction Garden, Bell, Md., where these plants have been grown during the past summer; on the left is an undetermined species of *Sorbaria*, in the right center (two rows) a species of *Photinia*, and on the extreme right a *Pyracantha*. (Photographed by Wilson Popenoe, August 27, 1923; P35030FS.)

great interest in the garden, especially since it is so seldom seen in this country. Although the flowers last but a short while, there is a succession in a mass planting of them which prolongs the display of yellow, orange, scarlet and various combinations of red as satisfactorily as many more durable species.

"The 'tiger flower' is adapted to the same situation in the garden as the gladiolus, is similarly handled and as easily grown. The species deserves much more extensive culture than it is receiving. While it can be treated like the gladiolus in cold climates, it thrives best when planting or transplanting of the stocks takes place in the fall; in other words, where there is no danger of the corms being injured by low winter temperatures."

TUMION FARGESII (Taxaceae), 58600. From Yunnan, China. Seeds collected by J. F. Rock, Collaborator of the Bureau of Plant Industry. "(October, 1923.) A tree 100 to 150 feet tall, with a trunk 4½ feet in diameter and huge descending branches, which grows rarely in the deciduous and semideciduous forests of the Mekong-Yangtze Divide, and also more commonly on the Mekong-Salwin Divide at an altitude of 10,000 feet. The fruits are the size of small walnuts. The tree prefers rich black soil and considerable rainfall." (Rock.)

VIBURNUM spp. (Caprifoliaceae). From Elstree, Herts, England. Seeds presented by Hon. Vicary Gibbs, Aldenham House Gardens.

58622. **VIBURNUM DASYANTHUM**. A hardy ornamental shrub about 7 feet high from the mountains of western Hupeh, China, where it grows at altitudes of 4,000 to 9,000 feet. The narrow, toothed leaves are dark metallic green above, paler beneath, and prominently veined. The flowers are in lax panicles, and the small red berries make the shrub a striking object of beauty in the fruiting season.

58623. **VIBURNUM PHLEBOTRICHUM**. A deciduous shrub, native to Japan, which is very similar to *Viburnum wrightii*, from the same country. It becomes 6 to 10 feet in height, with rather small, narrowly oval, bright-green leaves, white flowers produced in cymes 2 to 4 inches across, and roundish red berries which give the shrub a very attractive appearance.

Two Recent Explorations

Dr. Harry V. Harlan, agronomist in charge of barley investigations, Office of Cereal Investigations, Bureau of Plant Industry, returned to Washington recently after a 12-months' trip through India, northern Africa, and Spain, where he went in search of cereals which may prove of use in improving varieties grown in this country.

The last half of March and the month of April, 1923, were spent in Algeria and Tunis in the hope of finding original types which were brought into California through the early Spanish missions. Since much seed has been introduced into these countries from America, however, it was decided that types resembling more closely the original stock might be found elsewhere. On the northern plateau of Spain several

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barleys were found which closely resemble those grown in our Western States. Some of these may prove of value.

Several indigenous types have persisted in the oases of the Sahara. Two of these were collected. From the region of Lake Mariout in Egypt, two barleys were secured in 1904 which are now grown commercially in the United States. This region was visited by Doctor Harlan to see if other promising types might not be obtained. A large number of forms were found there, some of them indigenous; because of improvements in transportation seed has been introduced into the locality and old forms are disappearing. June and July were spent in India, mainly in the Vale of Kashmir, which lies at an elevation of 5,000 feet in the latitude of South Carolina. Here cereals were collected and alfalfa plants were found growing wild. On the plains of the Punjab an early barley was secured which may be of value in breeding varieties for the Southwest.

November, December, and January were spent in Abyssinia, where 59 days were devoted to a caravan trip from Adis Abbeba to Gallabat on the Sudan border. Grain sorghums which probably have been grown there for a very long time were secured. At the higher elevations little but barley was found; slightly lower down emmer is grown, and frequently broad beans; still lower wheat and teff are seen. Seeds of all these were brought home for trial.

Fred D. Richey, agronomist in charge of corn investigations, Office of Cereal Investigations, Bureau of Plant Industry, and Prof. R. A. Emerson, of Cornell University, returned about the middle of May from South America, where they went to secure varieties of Indian corn for use in breeding work.

Messrs. Richey and Emerson were gone three and a half months. During that time they traveled in central Argentina; crossed the Andes to Chile, where they went as far south as Temuco; visited the region of La Paz, in Bolivia; spent some time in the highlands of Peru near Cuzco, and finally collected specimens at Huancayo, Peru, whence they returned to the United States.

The principal object of their trip was to find types of corn which can be grown in regions of low summer temperature. With this in mind, they secured seeds from southern Chile, a region of cool summers and long days; and they found varieties of great interest near La Paz, Bolivia, at elevations of 12,600 feet. Over a hundred collections of seeds were made, and many photographs were taken.

Chaulmoogra Trees

Now that the dread disease, leprosy, long thought to be incurable, seems to be yielding to treatment with the ethyl esters of chaulmoogric

acid, the establishment of trees which yield chaulmoogra oil has become a subject of great importance in many parts of the world.

Ever since Mr. Rock's first voyage to Burma and Siam, in 1920-1921, the Office of Foreign Seed and Plant Introduction has been actively engaged in securing seeds of *Taraktogenos kurzii*, the true chaulmoogra, and its allies, propagating them, and distributing plants to all those regions where they are desired, and where they seem likely to succeed.

Mr. Rock's shipments of *Taraktogenos kurzii*, *Hydnocarpus wightiana*, *H. castanea*, *H. anthelminthica*, and *Gynocardia odorata* have yielded many plants. Seeds of *Oncoba echinata*, known also to contain chaulmoogric acid, but not yet tested as a commercial source of this substance, were obtained in quantity from Sierra Leone, and nearly three thousand plants were grown and distributed.

Naturally enough, there has been more interest in this subject in Hawaii than in any other portion of United States territory. Consequently, the Office has shipped large numbers of plants to Honolulu. Smaller numbers have been sent to the Canal Zone, Porto Rico, and other tropical dependencies of this country. Already one species, *Hydnocarpus wightiana*, has borne its first fruit in the Canal Zone.

Desiring to establish these trees in all tropical countries where they may prove useful, and to reciprocate some of the many favors which this Department has received at the hands of the republics of tropical America, the governments of Colombia, Brazil, Venezuela, Ecuador, Cuba and several other countries have been supplied with plants of *Taraktogenos kurzii* and *Oncoba echinata*.

With large numbers of plants already distributed, it seems certain that several chaulmoogra-yielding species will soon be fruiting widely in tropical America, and in Hawaii. Because of the importance which they promise to assume in the last-named region, and because of the interest which their cultivation has aroused throughout the world, we think it desirable to reproduce in Plant Immigrants the following paragraphs from an article by C. S. Judd, Superintendent of Forestry at Honolulu, published in *American Forests* for May, 1924:

"It is a long reach from Hawaii to Siam and to the winding Chindwin River and the Martaban Hills of Burma, but it was necessary to bridge this gap before the project of growing chaulmoogra trees for the production of oil could be started on a small island out in the Pacific Ocean, where by the scientific use of this promising drug a winning fight is being waged in the relief of those afflicted with leprosy.

"The man who made this project possible was J. F. Rock. During a series of explorations for plant material, begun in 1920, Mr. Rock secured and forwarded to Hawaii seeds of the various chaulmoogra trees, the *Hydnocarpus anthelminthica*, from Bangkok, Siam; the Kalaw (*Taraktogenos kurzii*), from near Mawlaik, in the Upper Chindwin District of Burma; and the

Hydnocarpus castanea, from the Martaban Hills, in lower Burma.

"The seeds, packed in charcoal for the long journey, arrived in good condition, and were carefully raised in germinating flats, and then transplanted into individual pots and held for a year, when they were ready to be set out. The work of planting was done by the Board of Agriculture and Forestry with the cooperation of the Hawaiian Sugar Planters' Association.

"On the advice of Mr. Rock, the well-drained foothills in the Waiahole Forest Reserve, on the windward side of the island of Oahu, over the mountain range from Honolulu, were selected as the site for the plantation of these trees, which in about eight years, it is hoped, will begin to bear the round fruit packed with seeds from which this much-desired oil is obtained.

"The properties of chaulmoogra oil for the treatment of leprosy have been recognized from early Asiatic history, and particularly in India it has been used as a palliative. Taken by way of the mouth, its administration was frequently attended by amelioration of the disease, although this was nauseating and offensive to the stomach, and at best the action was slow. More became known about chaulmoogra oil in 1904, when Dr. F. B. Power, of the Bureau of Chemistry, United States Department of Agriculture, determined the true origin and nature of the oil and succeeded in separating the physiologically active acids.

"In Hawaii, where the injection of chaulmoogra oil was tried at the Kalihi Leprosy Hospital by officers of the United States Public Health Service, the results led them to believe that a greater therapeutic value could be obtained from the oil if the active agent or agents were isolated and the liquids made more suitable for intra-muscular or intravenous injections.

"By a happy combination with the Territorial Board of Health and the United States Public Health Service, an excellent opportunity was afforded for the use of these derivatives in the Kalihi Hospital, near Honolulu, where the patients were under constant observation and control. Cases which improve to the point where the clinical signs have disappeared and the bacillus can no longer be demonstrated are recommended for parole. There is no way of demonstrating that any person has been absolutely cured of leprosy, but the patients who are paroled are believed to be free from the disease. In the great majority of cases which become bacteriologically negative there has been no reappearance of the disease. During a period of fourteen months ended March 15, 1924, 50 per cent of the leprosy patients at the Kalihi Hospital have recovered as a result of this specialized treatment and have been paroled. During the past five years over 260 patients have been discharged as cured. Only forty-five of these have returned on account of a recurrence of the disease.

"The oil now used for these derivatives is obtained from India,

where it is pressed cold and is imported at great expense. It is hoped that within ten years Hawaii will be supplying its own oil for the cure of this disease, from which the sting of dread and fear has been removed by the application of modern science.

"In starting the chaulmoogra plantation, the ground, where feasible, was first prepared by plowing and harrowing, and the wisdom of this treatment has been proved; for on such areas the chaulmoogra trees have made far better growth than where they were merely set out in holes dug in the guava and lantana brush. The first plantings were made in December, 1921, with 880 trees of *Hydnocarpus anthelminthica*, and have been added to until a total of 2,390 trees of this species are now included in the plantation. The balance is composed of 850 trees of *Taraktogenos kurzii* and 80 of *Hydnocarpus castanea*. In addition to these, 383 trees of the false chaulmoogra (*Gynocardia odorata*), which yields an oil different from chaulmoogra oil both in its physical characters and in its chemical composition, were planted on neighboring areas. The usual spacing adopted for the trees was 20 by 20 feet apart, but on some of the slopes a spacing as close as 15 feet was used."

FOREIGN SEED AND PLANT INTRODUCTION

Scientific Staff.

David Fairchild, Agricultural Explorer in Charge.

Wilson Popenoe, Agricultural Explorer Acting in Charge.

Roland McKee, Plant Introducer, Administration, Introduction Gardens and Experimental Work; P. H. Dorsett, and F. A. McClure, Agricultural Explorers; B. T. Galloway, Consulting Specialist; Peter Bisset, Plant Introducer, Quarantine, Inspection and Propagation; H. C. Skeels, Botanist, Seed Collection and Herbarium; R. A. Young, Plant Introducer, Dasheens and Tropical Yams; Alfred Keys, Specialist in Rubber Investigations; C. C. Thomas, Assistant Plant Introducer, Experimenters' Service; D. C. Peattie, Assistant Plant Introducer, Paul Russell, Junior Plant Introducer; E. L. Crandall and F. J. Hopkins, Assistants; Irving W. Dix, Plant Propagator.

Plant Introduction Garden Superintendents and Propagators.

Edward Goucher, Plant Propagator and Superintendent, Bell, Md. (P. O. Glenn Dale, Md.), Albert Close, Propagator, Ray W. Woodbury, Assistant in Plant Propagation; B. L. Peters, Acting in Charge, Bellingham, Wash.; W. A. Patten, Superintendent, Chapman Field, Fla. (P. O. Coconut Grove, Fla.), Charles H. Steffani, Propagator; J. E. Morrow, Superintendent, Chico, Calif., Henry Klopfer, Propagator; David Bisset, Superintendent, Savannah, Ga.; Edward Simmonds, Superintendent, Miami, Fla.

Special Collaborators.

L. H. Bailey, Ithaca, N. Y.; J. H. Dorsett, Glenn Dale, Md.; Robert H. Forbes, Kulikoro, French West Africa; A. C. Hartless, London, England; Holger Johansen, Balboa Heights, Canal Zone; Barbour Lathrop, Chicago, Ill.; Dr. H. L. Lyon, Honolulu, Hawaii; Henry Nehrling, Naples, Fla.; Dr. A. Robertson Proschowsky, Nice, France; J. F. Rock, Yunnan, China; Charles T. Simpson, Little River, Fla.; Dr. L. Trabut, Algiers, Algeria; Dr. William Trelease, Urbana, Ill.; E. H. Wilson, Jamaica Plain, Mass.